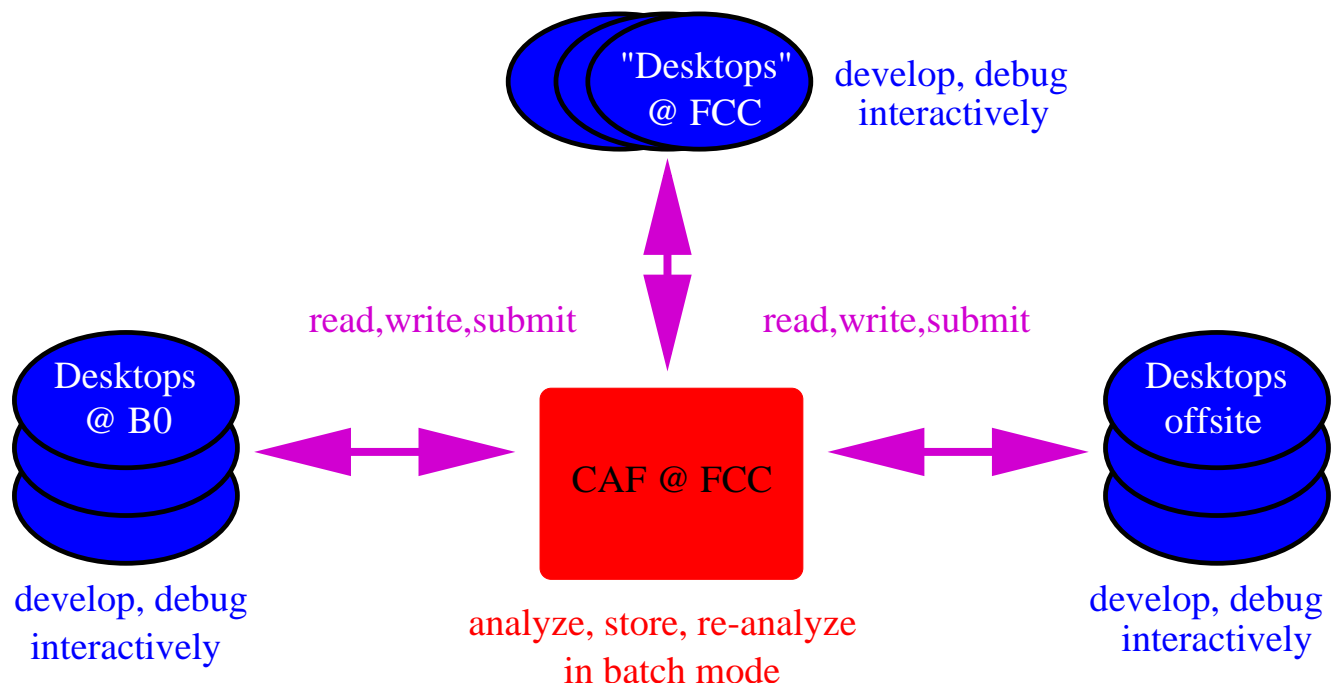


CDF Run2 Computing Model

Frank Würthwein (MIT)

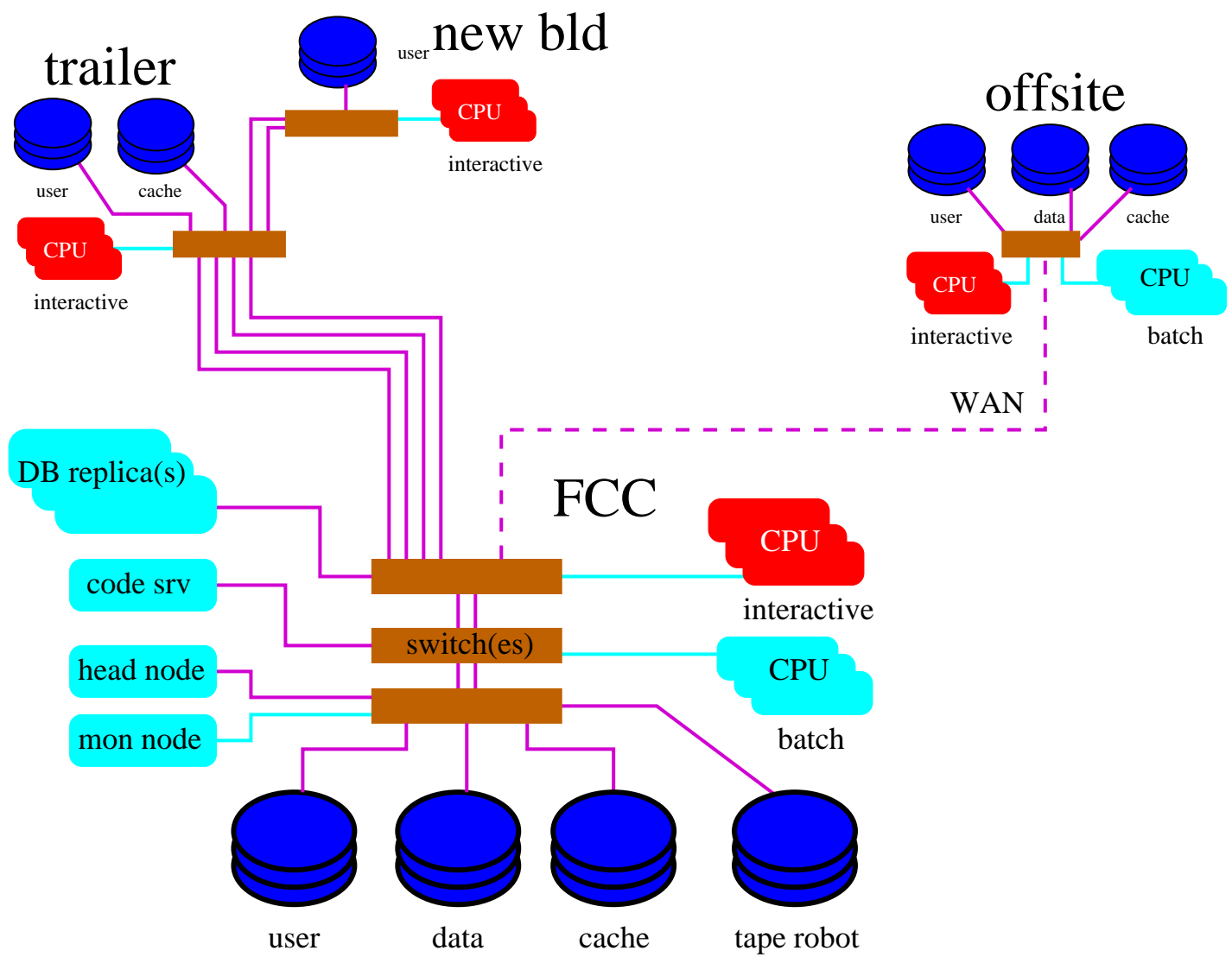
- Overview
- CAF Hardware
- CAF software
- Stage1 and beyond

Run2 Computing Model



- Code development anywhere.
- Job submission from anywhere.
- Analysis of $\sim 5\text{nb}$ dataset within days.
- Store skim in CAF or desktop.
- Re-run on skim on CAF or desktop.

Complete Hardware Picture



CAF hardware: motivation

- 100 fs \rightarrow 1600 disks \Rightarrow expect ≥ 3 drive failures per week!!!
 \Rightarrow we need hot-swap & RAID5 !!!
- physics groups want: 300TB/2fb $^{-1}$ \rightarrow need cheap disks: IDE
- 1THz CPU power/fb $^{-1}$ \rightarrow need cheap CPU: Dual PC's
- CDF software is slow: WN I/O < 10MB/sec until 2005!!!

CAF Hardware Constraints

- Space: ~ 40 racks available; ~ 30 racks needed: 1U Duals!!!
- match fs & WN I/O, CPU, and LAN networking.
- match cache disk size with archive vs disk I/O

Networking Constraints

- need to avoid many WN \rightarrow one fs
- Inter-switch I/O in FCC
- I/O FCC \leftrightarrow "B0"
- I/O new building \leftrightarrow "B0"
- I/O old trailers \leftrightarrow "B0"
- WAN I/O

CAF Stage1 hardware

1. File server

- 2.2TB useable after RAID50 (hot-swap)
- Dual 1.4GHz P3, 2GB RAM
- 200MB/s local I/O
- 1GigE: 65MB/sec LAN I/O, CPU limited (??).
- 4U rackmount

2. Worker Nodes

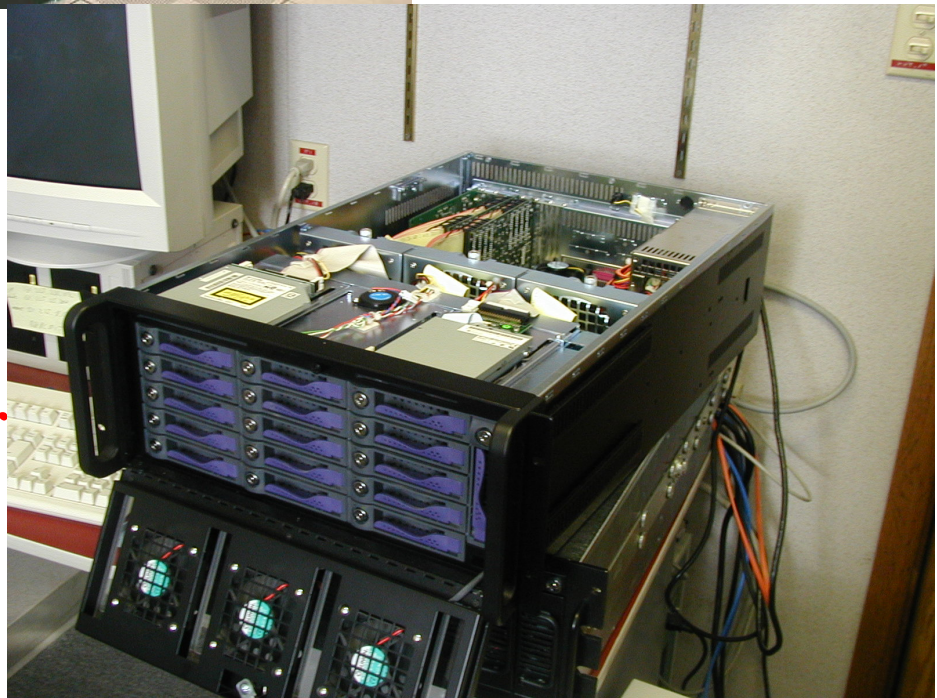
- Dual P3 1.26GHz / Dual Athlon MP 1600+
- 2GB RAM / 512MB RAM
- ~80GB scratch space, no raid
- 1FE: 10MB/sec
- 2U/1U rackmount

CAF Stage1 hardware



CAF Stage1
7 racks

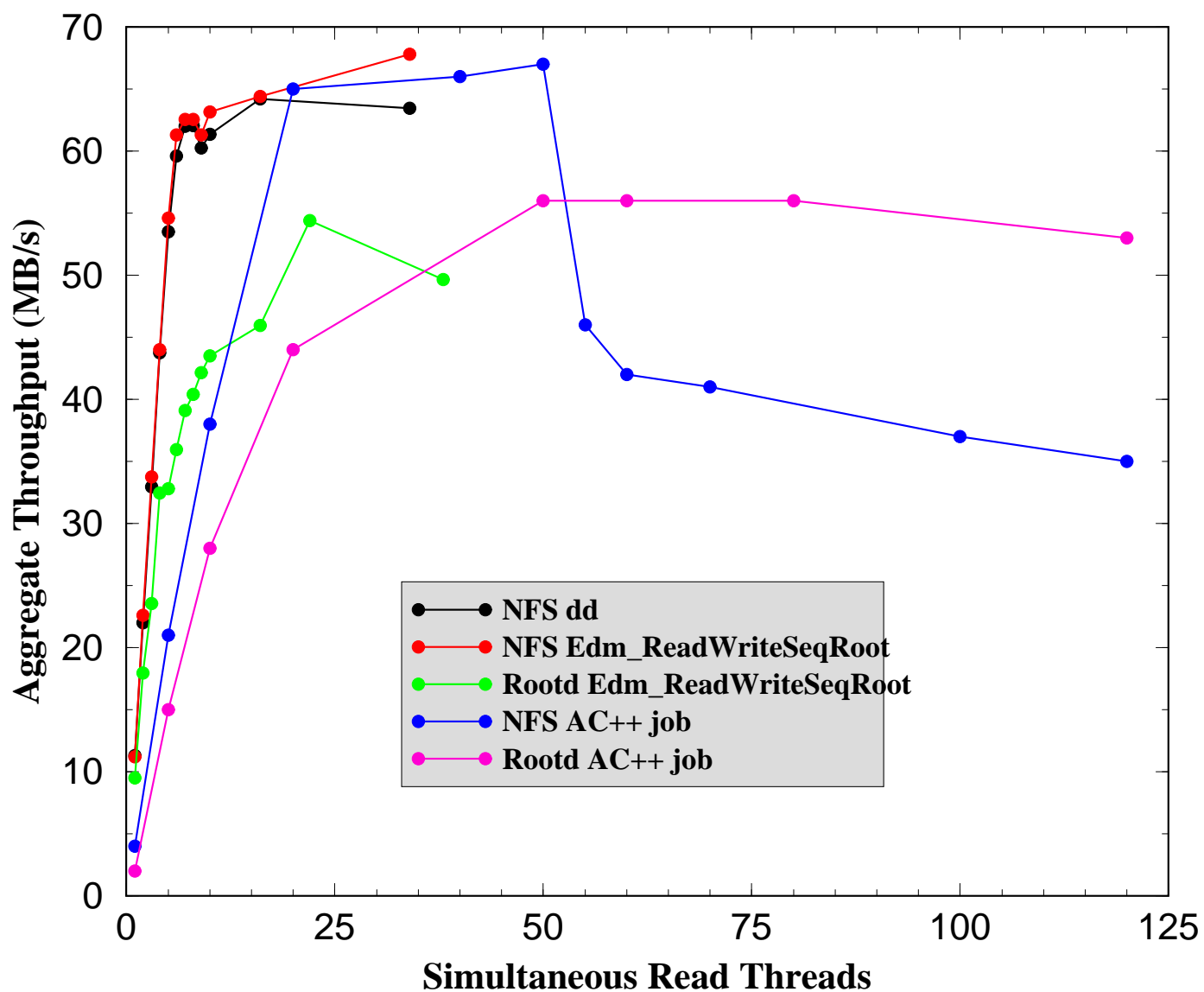
Stage1
file server
16 disks



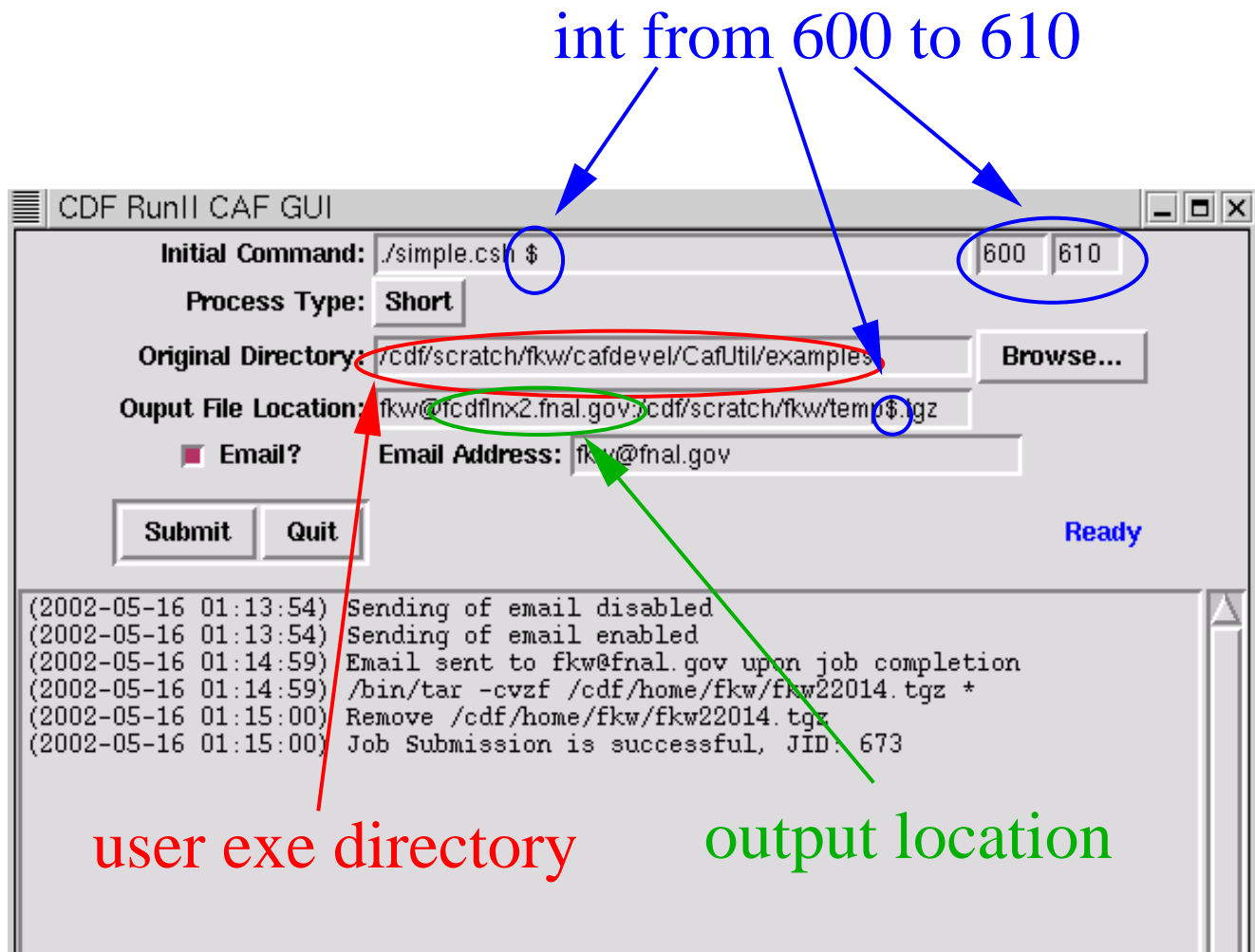
File Server Performance

CDF CAF File Server Benchmarking

Remote reads from CAF file server



CAF software: CafGui



- Specify shell script.
- Specify test, short, medium, long (5min,2h,6h,48h).
- Specify number of CPU's to run on.
- Specify input & output
- Submit!

CAF Development Team

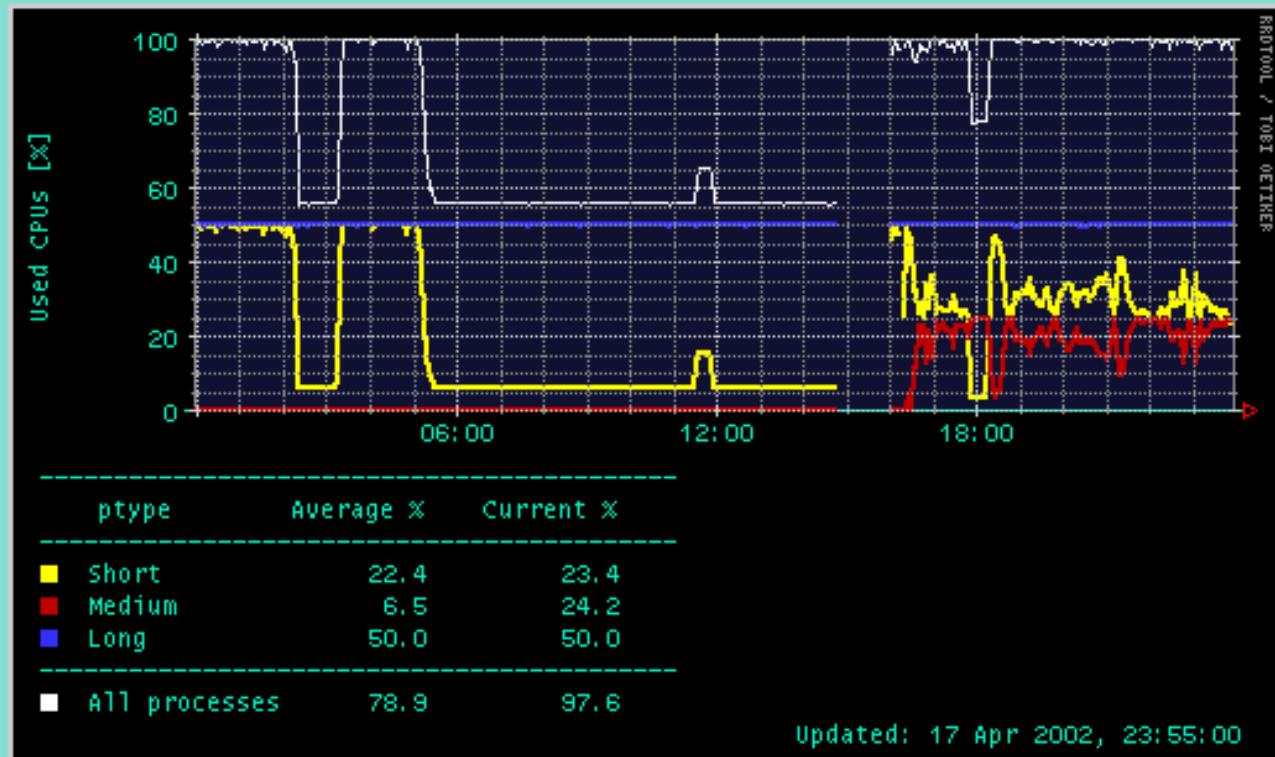
- FNAL CD: ~ 3 FTE
- MIT: 3 FTE
- INFN: ~ 2 FTE
- Others: ~ 1 FTE

Prototype & Stage1 project was completed in ≤ 6 months.

~ 4.5 FTE years development time for Stage1.

CAF Usage

Global CAF queues status



Status summary

	Short	Medium	Long	All types
Running sections	9	7	16	32
Pending sections	256	489	268	1013
Average waiting time	—	—	—	—

CAF Stage1 Unresolved Issues

- **Gain Operational Experience !!!**
 - find bugs
 - find bottlenecks
 - understand need for monitoring/alarms
- kerberized rootd
- integrate DH system (dCache now, SAM later)
- eliminate single point of failure
- university ownership issues
- Database Replicas

FY03 and beyond

- Scaling issues
- **Grid & SAM & DCAF**

Summary & Conclusion

- Paradigm shift for CDF computing.
- CAF from zero to Stage1 in ≤ 6 months.
- Reasonably clear path for remainder of Run2.